

REMARKS

Claims 1-25 are pending. In the Final Office Action, the Examiner rejected claim 25 under 35 U.S.C. §102(e) and further rejected claims 1-24 as being unpatentable under 35 U.S.C. §103(a). By this response, Applicants respectfully request reconsideration of the pending claims in view of the remarks set forth below.

Rejection Under 35 U.S.C. §102(e)

At paragraph 2 on page 2, the Examiner rejected claim 25 as being anticipated under 35 U.S.C. §102(e) by U.S. Patent No. 6,480,205 to Greene et al. (hereinafter *Greene*). Specifically, the Examiner stated that *Greene* discloses, “upon receiving a primitive object, dividing the primitive object into areas delimited by splits, wherein the splits are defined by analytic functions (column 16, lines 32-59; column 14, lines 10-19); representing depth information for at lest (sic) one of the areas by analytic function (column 17, lines 34-40); and performing a visibility test based on depth information for the areas (column 17, lines 34-45).” Applicants respectfully traverse.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The elements must be arranged as required by the claim. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Applicants respectfully contend that the portions of *Greene* cited by the Examiner do not disclose “*dividing the primitive object into areas delimited by splits*” as required by claim 25 (emphasis added). The passage at column 16 of *Greene* cited by the

Examiner begins, “the tile stack is initialized to a tiling record corresponding to the smallest tile in the z-pyramid *that encloses* the transformed polygon” (col. 16, lines 34-36, emphasis added). Further, the cited passage at column 14 relative to tiling records is preceded by an explanation of the procedure of creating tiling records. This procedure includes “step 904 determines the smallest NxN tile in the pyramid *that encloses the transformed polygon*” (col. 13, lines 51-52, emphasis added). The procedure continues, “step 908 computes the equation of the plane of the polygon and the equation of each edge of the polygon... relative to the smallest *enclosing NxN tile*” (col. 13, lines 63-66, emphasis added). Therefore, the cited portions of *Greene* do not teach dividing the primitive object into areas, but rather teach finding tiles that enclose the object.

Further in contrast to the invention of claim 25, *Greene* does not disclose dividing the primitive object into areas, but rather divides image space into tiles to determine whether a primitive affects particular tiles. *Greene* states, “[t]iling is performed by recursive *subdivision of image space*” (col. 3, lines 54-55, emphasis added). “The algorithm performs z-buffer tiling hierarchically on NxN *regions of image space* using a z-pyramid” (col. 6, lines 20-22, emphasis added). In the Definitions section, *Greene* states, “[a] cell in the z-pyramid is the *region of the screen* corresponding to a value in the z-pyramid...[a]t coarser levels of the z-pyramid, *cells correspond to square regions of the screen*” (col. 6, lines 55-61, emphasis added). Describing hierarchical z-buffering, *Greene* states, “each entry in the pyramid represents the farthest visible z *within a square region of the screen*,” and, “visibility can be established definitively by *subdividing the enclosing image cell* [around a primitive] into an NxN grid of subcells” (col. 3, lines 9-18, emphasis added).

These cited portions show that the method of Greene teaches dividing image space, and not dividing the primitive object into areas as required in claim 25. Because all elements of the claim are not expressly or inherently disclosed, *Greene* does not anticipate claim 25.

Rejection under 35 U.S.C. §103(a)

In paragraph 2 under the heading “Claim Rejections - 35 U.S.C. §103,” the Examiner rejected claims 1-4, 8-11, 23 and 24 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,923,332 to Izawa (hereinafter *Izawa*), in view of *Greene*. The Examiner rejected claims 5-7 and 12-14 over *Izawa* in view of *Greene* further in view of U.S. Patent No. 5,509,110 to Latham (hereinafter *Latham*). With respect to claim 1, the Examiner stated,

Izawa discloses representing depth information by a piecewise function (column 6, lines 27-51) and updating the piecewise function based on the results of the visibility test (column 7, lines 12-28). *Greene* discloses upon receiving a primitive object, dividing the primitive object according to areas defined by at least one analytic function (column 16, lines 32-59; column 14, lines 10-19); performing a visibility test based on depth information for the areas (column 17, lines 34-45). (emphasis in original).

Applicants respectfully contend that not all limitations of claim 1 are taught or suggested by *Izawa* in view of *Greene*. To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). As noted with respect to claim 25, *Greene* does not disclose or suggest “***dividing the primitive object according to areas defined by at least one analytic function***” as required by claim 1 (emphasis

added). Rather, as noted with respect to claim 25, Greene merely discloses dividing image space.

Furthermore, *Izawa* does not teach or suggest updating the piecewise function based on the results of the visibility test, as asserted by the Examiner. The paragraph immediately preceding the text cited by the Examiner includes, “[t]here is no restrictive rule as to how to divide the Z coordinates and how many segments it is divided into” (*Izawa* col. 6, lines 22-24). There is also no discussion or suggestion in *Izawa* about updating the piecewise function based on the results of the visibility test, as required by claim 1. Instead, *Izawa* teaches dividing the Z-axis into a plurality of segments, comparing Z-values of perspective coordinates of polygons within the segments, and storing the corresponding smallest Z-value in a Z-buffer. In pertinent part, *Izawa* teaches,

the geometric-conversion unit 2 carries out the perspective-conversion process...*the Z coordinate is divided into a plurality of segments*, and Z values are normalized for each space of the divided segments to obtain Z values of the perspective coordinates for polygons constituting the objects. (col. 7, lines 49-55, emphasis added.)

Izawa does not teach or suggest updating the piecewise function based on the results of the visibility test. Applicants strain to understand how *Izawa* teaches or suggests this claim element. Applicants submit that because neither *Greene* nor *Izawa* nor the combination thereof discloses or suggests all elements of claim 1, claim 1 is not obvious thereby.

If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Claims 2-7 depend from and add further limitations to independent claim 1 and are therefore nonobvious. In a particular example, claim 7 adds to the limitations of claim 1, “wherein each piece of the piecewise function is *defined on a segment of a scanline*” (emphasis added). The Examiner stated that Izawa discloses this limitation. On the contrary, *Izawa* discloses only dividing the Z-axis into a plurality of segments. There is no teaching or suggestion that the piecewise function relating to depth information is or should be defined on a segment of a scanline.

In paragraphs 2d-2f of the Final Office Action at page 4, the Examiner stated that claims 8-11, 23 and 24 “are similar in scope and are rejected under the same rationale” as claims 1-4. Because independent claim 1 is nonobvious for at least the reasons given above, independent claims 8, 23 and 24 are also nonobvious for at least the same reasons. Claims 9-14, which depend upon claim 8, are likewise nonobvious under *In re Fine*.

At paragraph 3 on page 5 of the Final Office Action, the Examiner rejected claims 15 and 16 as unpatentable over *Latham* in view of *Izawa*. The Examiner stated, in part, “Latham does not explicitly disclose comparing depth information with depth information defined by an area represented by a piecewise function,” but “Izawa discloses comparing depth information with depth information defined by an area represented by a piecewise function (Abstract; column 7, lines 12-28).”

Applicants respectfully assert that *Izawa* does not disclose or suggest ***comparing depth information with depth information defined by an area represented by a piecewise function***, in contrast to the assertion of the Examiner. As discussed above with respect to claim 1, *Izawa* teaches, “***the Z coordinate is divided into a plurality of segments***” (col. 7, lines 51-52, emphasis added). However, an “area” is defined as “a plane or curved surface; two-dimensional extent” (Random House Webster’s College Dictionary, 2nd Ed, April 2000, page 71). *Izawa* teaches dividing ***only the single-dimension Z-axis*** into a plurality of segments. *Izawa* does not disclose or suggest ***representing an area by a piecewise function***. As well, *Latham* does not disclose or suggest this limitation. Neither *Izawa* or *Latham* or the combination discloses or suggests all limitations of claim 15, so claim 15 is nonobvious thereby.

Claim 16 directly depends and further limits independent claim 15, and is allowable for at least the same reasons advanced with respect to claim 15.

In paragraph 4 at page 6, the Examiner rejected claims 17-22 as unpatentable over *Greene* in view of *Latham* further in view of *Izawa*. The Examiner stated, in part, “*Izawa* discloses comparing depth information with depth information defined by an area represented by a piecewise function.”

Applicants respectfully contend that not all claim limitations of claims 17-22 are taught or suggested by the prior art, in contrast to the assertion of the Examiner. As illustrated above with respect to claim 15, *Izawa* does not disclose or suggest ***comparing depth information with depth information defined by an area represented by a piecewise function***. Rather, *Izawa* merely teaches, “***the Z coordinate is divided into a***

plurality of segments" (col. 7, lines 52-53, emphasis added), and does not disclose or suggest representing an area by a piecewise function. As well, neither *Greene* nor *Latham* discloses or suggests this limitation. Because *Greene, Izawa, Latham* or the combination does not disclose or suggest all limitations of claim 17, claim 17 is nonobvious thereby. Further, because independent claim 17 is not obvious, dependent claims 18-22 are not obvious for at least the same reasons.

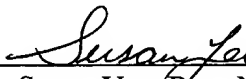
CONCLUSION

Applicants respectfully submit that the rejections of claims in the Office Action of October 6, 2003 have been traversed. In particular, the above remarks demonstrate that *Greene, Izawa, or Latham*, either individually or in combination, do not teach all of the claim limitations in the claimed invention. Thus, upon consideration of the above remarks, Applicants submit that the application is in condition for allowance. If the Examiner has any questions regarding the case, the Examiner is invited to contact Applicant's undersigned representative at the number given below.

Respectfully submitted,

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